



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/719,062

11/24/2003

Atsunori Tsuji

046124-5254

9116

55694 7590 11/02/2007
DRINKER BIDDLE & REATH (DC)
1500 K STREET, N.W.
SUITE 1100
WASHINGTON, DC 20005-1209

EXAMINER

FLOOD, MICHELE C

ART UNIT	PAPER NUMBER
----------	--------------

1655

MAIL DATE	DELIVERY MODE
-----------	---------------

11/02/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/719,062

Applicant(s)

TSUJI ET AL.

Examiner

Michele Flood

Art Unit

1655

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 August 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5,7 and 9 is/are pending in the application.
- 4a) Of the above claim(s) 2 and 3 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4,5,7 and 9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of the species "to inhibit transpiration through a leaf on the branch in the reply filed on August 8, 2007 is acknowledged.

Claims 1, 4, 5, 7 and 9 are under examination. The claims have been examined insofar as they read on the elected invention.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 4, 5, 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffman (A*) in view of Clark et al. (B*) and Raven et al. (U).

Applicant claims a method of introducing a substance into plant tissue of a plant having branches comprising removing branch tissue to expose conductive tissue of a branch; contacting the exposed conductive tissue of the branch with a substance; and increasing an amount of the substance that is absorbed through the conductive tissue of the branch by inhibiting means being carried out in order to inhibit transpiration through a leaf on the branch or to inhibit water requirement by the leaf, such that a driving force of transpiration provides a flow of the substance into the conductive tissue. Applicant further claims the method of claim 1, wherein the inhibiting means is closure of stomata

of leaves. Applicant further claims the method of claim 4, wherein the closure is accomplished by introducing into tissue of the leaves, a chemical that closes the stomata. Applicant further claims the method of claim 1, wherein the conductive tissue consists of vessels; and, wherein the plant is a dicotyledonous plant.

Hoffman teaches a method of introducing a substance into plant tissue comprising use of an implantable device for the release of active substances to plants which the substance is distributed to the open pores of the plant. For example, Hoffman teaches that the implant can be inserted into the plant's shoot axis by inserting it into previously formed cavities; and that is particularly suitable for the use in plants having lignified sprouts, in Column 4, lines 18-23. Any material may be used as active substance such as plant restoratives, growth regulators or nutrients (See abstract; Column 3, lines 49-54; and, Column 4, lines 18-22.). Hoffmann further teaches that low water potential inhibits the release of active compounds (See Column 1, lines 25-29.). Low water potential is caused by transpiration, which can be prevented by removing leaves or applying an anti-transpirant.

The teachings of Hoffmann are set forth above. Hoffman teaches the instantly claimed invention except for increasing an amount of the substance through the conductive tissue of the branch by employing an inhibiting means for the inhibition of transpiration through a leaf on the branch such that a driving force of transpiration provides a flow of the substance into the conductive tissue and using a chemical that closes stomata as an inhibiting means. However, it would have been obvious to one of ordinary skill in the art to add the instantly claimed process step to the method taught by

Art Unit: 1655

Hoffman to provide the instantly claimed invention because at the time the invention was made the instantly claimed process steps and experimental conditions were known to increase the flow of absorbed substances through the conductive tissue of plant due to a driving force of transpiration, as evidenced by the teachings of Clark and Raven.

Firstly, Clark teaches a method that can reduce plant water loss by closing stomata openings and reducing plant transpiration in dicotyledonous plants by chemical means. Clark further teaches, "Transpiration is the evaporation of water from plant tissue. The major water loss through the leaves and usually occurs in two simultaneously operating stages; first, evaporation of water from the moist cell walls into the intercellular spaces of the leaf, and second, diffusion of water vapor from the intercellular spaces, through the stomata, to the outside air", in Column 1 lines 29-35. In Column 1, lines 58-60, Clark teaches that pruning of leafy branches can be used as a means to inhibit transpiration. The compositions taught by Clark can be applied to plants to form a substantially water impervious barrier on the surface of leaves: "The stomata actions are interfered with and the water transpiration is substantially stopped. The movement of oxygen and other transpiration gases, is however, apparently not impaired, as no phytotoxic symptoms are generally observed." See Column 5, lines 4-17. Secondly, like Clark Raven teaches that transpiration is a major determining factor in the movement of solutes and water through the plant body from the ground to the atmosphere: "From the root hairs, the water moves through the cortex, the endodermis (the inner layer of cortical cells), and the pericycle, and into the primary xylem". See page 524, under

"Absorption by Roots". Under the same heading, Clark also teaches that the transpiration stream, in addition to keeping the leaves of the plant provided with water, distributes mineral ions to the shoot as well; and, that when transpiration is occurring, the ions are carried rapidly throughout the plant. Other factors affecting the rate of transpiration include carbon dioxide concentration in the intercellular spaces, light, temperature, atmospheric humidity, air currents, and availability of soil water. Most of these factors have an affect on the opening and closing of stomata. Raven also teaches that the physiology of the conductive tissue of plants, the unique properties of water, the principles governing the movement of water through plant tissue, water potential, hydrostatic pressure in plant cells (turgor pressure), and water tension affect the translocation of water and solutes through plant vessels, sieves, phloem and xylem; and the evaporation of plant water through stomata. At the time the invention was made, one of ordinary skill in the art would have been motivated to combine the method taught by Hoffmann with the method taught by Clark because Hoffmann taught a device for the release of active substances into exposed conductive tissue of plants; Clark taught that use of chemical means to close stomata openings was advantageous; and, Raven taught the factors affecting plant transpiration and movement of water and solutes through the conductive tissue of plants of photosynthesizing plant tissue. Thus, at the time the invention was made, one of ordinary skill art would have had a reasonable expectation of success that the combining of the method taught by Hoffman with the method taught by Clark would provide the instantly claimed method because

Raven teaches closing of stomata, such as the chemical inhibiting means used in the closure of leaf stomata taught by Clark, not only prevents loss of water from the leaf but causes a transpiration stream for the rapid movement of ions throughout the plant; Raven also teaches that absorption of substances into a sieve tube decreases its water potential and causes water to move into the sieve tube from the xylem and mass flow of the substance out of the sieve tube with the movement of water from a source to sink. Given, the foregoing it would have been *prima facie* obvious to one ordinary skill in the art that the combining of the method for introducing a substance into exposed conductive tissue taught by Hoffman with the transpiration inhibiting means by chemical closure of leaf stomata taught by Raven would create a driving force of transpiration that would increase an amount of the substance introduced into the conductive tissue by the method of introducing a substance into plant vessels taught by Hoffman.

Accordingly, the claimed invention was *prima facie* obvious to one of ordinary skill in the art at the time the invention was made, especially in the absence of evidence to the contrary.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michele Flood whose telephone number is 571-272-0964. The examiner can normally be reached on 7:00 am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terry McKelvey can be reached on 571-272-0775. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Michele Flood
Primary Examiner
Art Unit 1655

MCF
October 29, 2007


MICHELE FLOOD
PRIMARY EXAMINER